LIST OF U.S. CUSTOMS LABORATORY METHODS

USCL NUMBER	METHOD	TITLE
70-01	USCL Manual	Testing of Pressed and Toughened (Specially Tempered) Glassware
70-02	ASTM E 228	Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer
70-03	ASTM D 578	Specification for Glass Fiber Yarns

U.S. CUSTOMS LABORATORY METHODS

USCL METHOD 70-01 INDEX

Pressed and Toughened (Specially Tempered) Glassware

SAFETY PRECAUTION

CERTAIN PROCEDURES DESCRIBED IN THIS METHOD POSE A POTENTIAL HAZARD TO PERSONNEL FROM THE PROXIMITY TO OR HANDLING OF BREAKING OR BROKEN GLASS. THIS METHOD SHALL NOT BE UNDERTAKEN WITHOUT SUPERVISORY CONCURRENCE THAT ADEQUATE PRECAUTIONS FOR PERSONAL SAFETY HAVE BEEN IMPLEMENTED.

0 SCOPE

This method employs macroscopic analysis, thermal shock testing, and evaluation of temper to determine if a glassware item has been pressed and toughened (specially tempered) for Customs purposes.

1 FIELD OF APPLICATION

These glassware articles are normally imported under Subheading numbers 7013.29.05, 7013.32.10, 7013.39.10, and 7013.99.20 of the Harmonized Tariff Schedule of the United States (HTSUS). Articles of "safety glass, consisting of toughened (tempered) ... glass" normally imported under Heading 7007 of the HTSUS, e.g., vehicle windshields, are not within the purview of this method.

2 APPARATUS

2.1 Photographic Equipment

A camera (equipped with flash or supplemented by adequate lighting) is recommended for making a permanent record of unusual samples and test results.

2.2 Polariscope

The basic instrument consists of a light source, a polarizer, and an analyzer. The addition of a full-wave retardation, or tint, plate permits observation of color-enhanced stress patterns. Ideally, the working space, or distance between the polarizer and the analyzer, should be large enough to accommodate samples ranging up to eight inches in height.

2.3 Tile Saw (or Similar Table-Mounted Circular Saw)

A tile saw having a cutting head which can be adjusted horizontally and vertically and which is equipped with an 8 to 12 inch diameter diamond-rimmed blade designed for wet cutting is adequate for cutting glassware articles.

2.4 Other Apparatus and Supplies

The method requires various common laboratory articles such as a caliper or similar device for measuring the diameter of the opening and the maximum inside diameter of the sample, an oven and water bath, and other equipment and supplies. Appropriate safety devices and personal protective equipment are also required.

3 SAMPLING

When available a representative number of samples should be analyzed. However, it is recognized that for any of several reasons, e.g., cost of the item, only a limited number of samples may be submitted for analysis. The possibility exists that only one sample may be available for testing.

4 ANALYSIS PROCEDURES

The following procedures may be conducted in whatever order the analyst deems is appropriate for the particular sample being examined. The test protocol should be terminated at the point that a sample fails to meet any of the key criteria, i.e., "pressed", "toughened", "tempered", or "specially".

4.1 Macroscopic Analysis

4.1.1 Visual Inspection

Inspect the sample for the following:

, identifying marks, labels, sizes, etc., especially those that may have been caused by a push-up valve and a mold that have been pressed into the article;

, the style (stemware, tumbler, bowl, plate, etc.);

, the presence of ribs, handles, flutes, etc.;

, the size of the rim or opening, if applicable;

, the size of the most bulbous portion of the article;

, any other unusual characteristics (e.g., chips, cracks)

4.1.1.1 Interpretation of Visual Inspection results

Characteristics such as mold marks, ribs, handles, and flutes are often indicative of a pressed rather than blown glass article.

4.1.2 **Dimensional Measurement** (applies only to stemware, tumblers, bowls, etc.):

4.1.2.1

Using a caliper or similar device, measure the minimum diameter of the mouth, opening, or upper rim of the sample. With the same device, measure the maximum inside diameter. Record both measurements.

4.1.2.2 Interpretation of Dimensional Measurement results

A sample having a maximum inside diameter greater than the minimum diameter of the mouth, opening, or upper rim is not likely to have been "pressed".

4.1.3 Interpretation of the Macroscopic Analysis Test

The analyst is advised to consider the overall features of the article and the dimensional analysis test results in determining that an article has been "pressed". If

the results show that the sample is not "pressed" the testing sequence for this sample should be terminated at this point.

4.2 Thermal Shock Test

4.2.1 Heat the sample(s) in an oven to 160°C for 30 minutes.

4.2.2 Remove 1 sample from the oven and immediately immerse it in a water bath set at 25°C. This effects a 135°C difference in temperature. [Note: Reasonable alternate oven and water bath settings up to ± 10°C are acceptable as long as the 135°C difference in temperature is maintained.]

4.2.3 Interpretation of Thermal Shock Test Results

Annealed glassware and inadequately or partially tempered glassware will generally not survive this test of durability or toughness. If breakage occurs, the sample is not "toughened" for Customs purposes. Record the findings, and terminate the analysis.

4.3 Evaluation of Temper

4.3.1 Polariscopic Examination

This method for the qualitative evaluation of temper in glassware should be conducted only on transparent or translucent articles. This method is not applicable to opaque items or to articles which have been tempered by a process other than thermal tempering. In addition, some translucent articles will not transmit enough polarized light to permit the observation of stress patterns; these items should be evaluated for temper using the Cutting Test.

4.3.1.1 Place the full-wave retardation plate (tint plate) between the polarizer and the analyzer. The polarized light must pass through both the sample and the retardation plate for the color-enhanced polariscopic pattern to be observed through the analyzer. Position the retardation plate in direct contact with the polarizer or, alternatively, just in front of the analyzer.

4.3.1.2 Turn on the light source.

4.3.1.3 Evaluate the stress in the bottom of the intact article by placing its bottom surface in contact with the polarizer so that the polarized light passes perpendicularly through the bottom surface, or as close to perpendicularly as possible, depending upon the article's shape. [This positioning does not work well with stemware because of color patterns caused by the stem itself. With these items, it will be necessary to hold the glass at a slight angle to view the base and the bowl separately.]

4.3.1.4 Evaluate the stress in the sides of the intact article, especially near the rim or edge, by positioning the article so that the polarized light passes perpendicularly through the sides near the rim, or as close to perpendicularly as possible, depending upon the article's shape. Observation of the stress patterns in the sidewall and rim areas should be made while viewing through a single thickness of glass. For some items, especially

stemware, tumblers, and mugs, this will require holding the article at a slight angle to the polarizer (open end raised slightly).

4.3.1.5 Interpretation of the Polariscopic Examination

Thermal tempering of glassware involves heating to the softening point followed by rapid cooling. The surfaces cool first and reach a temperature where they become rigid. With further cooling, the interior or core tries to shrink but is prevented from doing so by the rigid surface layers. This results in the surfaces being locked into a state of high compression and the interior locked into compensating tension.

When polarized light rays travel through a stressed material, they divide into slow and fast fronts. As a result of the difference in speed of the slow and fast rays, interferences occur and a pattern of colors is observed. These colors can be used to evaluate the stresses in the article. As the stress increases, the observed color changes to reflect the amount of stress. The color changes follow a rigorous sequence as the stress-induced retardation, or distance between the fast and slow rays, increases. In low-stress areas, black and shades of gray are seen. Evaluation of low stress is simplified by using a color-enhancing retardation or tint plate which adds a shift of one fringe order, or 565 nm, in the color pattern throughout the observed field. With the tint plate in place, even low and moderately stressed areas will exhibit a contrasting color effect.

Annealed glassware will exhibit a uniform coloration of the polarized light passing through it; there will be essentially no change from background. Tempered articles will exhibit non-uniform coloration of the polarized light on the bottom surface and sidewalls and bands of color parallel to the rim or lip. [Note: With highly colored articles, it may be helpful to conduct the polariscopic exam without the tint plate. There will be no color enhancement, but the gray to black interference patterns should be readily discernible in tempered articles.]

If the sample passes the Thermal Shock Test and shows evidence of full-surface tempering (as opposed to rim-tempering or partial tempering) when examined polariscopically, the sample has been "toughened (specially tempered)" for Customs purposes.

4.3.2 Cutting Test for Opaque Glassware

This test is applicable to opaque articles and to those translucent articles which can not be examined polariscopically because of inadequate transmission of the polarized light.

4.3.2.1 Adjust the cutting head of the tile saw vertically and horizontally, as necessary, to accommodate the glassware article.

4.3.2.2 Be sure the water supply to both sides of the diamond-rimmed blade is adequate.

4.3.2.3 Turn on the saw.

4.3.2.4 While holding or otherwise securing the article to prevent twisting and binding during the cutting, slowly and gently move the article into contact with the blade.

4.3.2.5 Proceed with the cutting.

4.3.2.6 Interpretation of the Cutting Test

Annealed (non-tempered) glassware will readily accept the diamond-rimmed blade and will be cleanly cut in half. Tempered glass, on the other hand, will break into pieces when cut. Tempered soda lime and borosilicate glass will break almost immediately, whereas tempered fluorosilicate glass will not break until the blade has cut through at least part of the article. The extent of cutting needed to induce breakage may vary from item to item, but in no event will tempered articles be cleanly cut in half by the diamond-rimmed blade.

A sample that passes the Thermal Shock Test and shows evidence of tempering per the guidance given above for the Cutting Test has been "toughened (specially tempered)" for Customs purposes.

5 BIBLIOGRAPHY

5.1 ***Federal Register***, Vol. 59, No. 55, March 22, 1994, p. 13531

5.2 ***Customs Bulletin and Decisions***, Vol. 28, No. 13, March 30, 1994, p. 18

5.3 ***Federal Register*****,** Vol. 59, No. 68, April 8, 1994, p. 16895

U.S. CUSTOMS LABORATORY METHODS

USCL METHOD 70-02

Index

ASTM E 228
Test Method for Linear Termal Expansion of Solid Materials With a Vitreous Silica Dilatometer

SAFETY PRECAUTIONS

This method does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this method to establish appropriate safety and health pract ices and determine the applicability of regulatory limitations prior to its use.

1 SCOPE AND FIELD OF APPLICATION

Chapter 70 of the Harmonized Tariff Schedule of the United States (HTSUS) covers glass and glassware. This method can be used to determine the linear coefficient of expansion of glass or glass-ceramic materials. The temperature range specified by this method is much greater than those specified in the various subheadings of HTSUS Chapter 70. Specialized equipment is required for this measurement.

2 REFERENCES

ASTM E 228
Test Method for Linear Termal Expansion of Solid Materials With a Vitreous Silica Dilatometer

U.S. CUSTOMS LABORATORY METHODS

USCL METHOD 70-03

Index

ASTM D 578
Specification for Glass Fiber Yarns

SAFETY PRECAUTIONS

This method does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this method to establish appropriate safety and health pract ices and determine the applicability of regulatory limitations prior to its use.

1 SCOPE AND FIELD OF APPLICATION

Chapter 70 of the Harmonized Tariff Schedule of the United States (HTSUS) covers glass and glassware. Glass fibers and articles thereof are classified under heading 7019 of the HTSUS. This method, which is actually an ASTM Standard Specification, contains considerable information on glass fiber yarns. However, other methods may have to be used to obtain the information required by the various subheadings under Heading 7019.

2 REFERENCES

ASTM D 578
Specification for Glass Fiber Yarn